Automated Retrieval of Information on Assistive Devices (ARIAD)

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Introduction

Application of new technology to the problems of rehabilitative engineering and physical medicine is producing new kinds of assistive devices, as well as new versions of familiar devices. In some areas of the field the advances occur so rapidly that individual doctors and related health care professionals have difficulty keeping their information up to date. A result can be the risk of failing to prescribe the most appropriate aids for patients. Consumers or their families have similar problems when they try, independently, to learn about the aids that are now available for their various needs.

The situation has prompted a number of efforts to categorize and systematize information about assistive devices, and to make relevant information available to those needing it.

The U.S. Government's Department of Education publishes a resource guide called Rehabilitation Engineering and Product Information: Resource Guide (1) which lists major sources of rehabilitation information available from private and federal agencies. This is an indirect information source and its main strength is the completeness of its listings of places to go for detailed information. (Among the sources listed are the VA's Office of Technology Transfer, Smithsonian Science Information Exchange, the National Technical Information Service of the U.S. Department of Commerce, the National Library for the Blind and Physically Handicapped, NASA's Technology Utilization Program, the Smithsonian Science Information Exchange, the National Library for the Blind and Physically Handicapped, and the Rehabilitation Engineering Service, Rehabilitation Engineering, and Product Information : Resource Guide (1) which lists major sources of rehabilitation information available from private and federal agencies. This is an indirect information source and its main strength is the completeness of its listings of places to go for detailed information. Among the sources listed are the VA's Office of Technology Transfer, Smithsonian Science Information Exchange, the National Technical Information Service of the U.S. Department of Commerce, the National Library for the Blind and Physically Handicapped, and the Rehabilitation Engineering Service, Rehabilitation Engineering Information Center (NARIC), and the Trace Research & Development Center for the Severely Communicatively Handicapped.) Another resource guide, from the Department of Health, Education, and Welfare, lists more than 50 data banks containing information on assistive devices for the disabled (2).

Prominent among the computerized data systems intended for widespread accessibility in the field of rehabilitation aids and assistive devices is a commercial effort called Accent on Information. It is a proprietary computerized system developed by Raymond Cheevers (3). The National Institute for Handicapped Research has been sponsoring ABLEDATA, which has been designed to be used through persons called information brokers who accept, interpret, and process requests for information. Data held by ABLEDATA may be accessed through either computer and/or manual searches. ABLEDATA is presently in the pilot stage, with brokers located at Charlottesville, Virginia, and in California at Palo Alto, Downey, and Sacramento (4). A pilot course for the training of additional brokers was planned for November 1981, with expansion of the training program intended in 1982. The ABLEDATA System is now based with NARIC5.

Other systems also exist, or are believed to exist, but it is characteristic of the situation that few details are available and information about them tends not to be widely circulated. Of the systems reviewed, Accent on Information (AOI) and perhaps ABLEDATA appear able to meet the generally accepted goal of providing easily accessible, relevant, complete, and rapid information on assistive devices that could satisfy a need. But it could not be said that a survey of existing conditions finds a satisfactory choice among well established, convenient to use, and easily accessible services, in place and available. This seems to be the case whether the seeker is a disabled consumer or a provider of direct rehabilitation services.

In light of the existing situation, the Biomedical Engineering Department at Louisiana Tech University has developed a set of computer programs to achieve Automated Retrieval of Information on Assistive Devices (ARIAD). The goals of ARIAD are:

1. To provide a systematic and expandable method of storing information on assistive devices;
2. To provide computer-aided matching between the end-user's functional abilities and limitations versus the operational requirements and capabilities of a particular device;
3. To provide relevant, usable, and up-to-date information quickly to the requestor, whether an end-user or a rehabilitation service provider; and
4. To provide an information service that minimizes staffing requirements (i.e. as few high-salaried professionals as briefly possible) and computer hardware requirements (i.e. implementable on a modest sized mini-computer).

The accomplishment of the above goals, especially the second, is what makes ARIAD different from information systems reported in the literature.

The remaining sections of this paper discuss how ARIAD functions with the outside world (e.g., with computer operators, rehabilitation personnel, and requestors of information); the coding scheme used to allow efficient storage, matching, and retrieval of information on assistive devices with regard to the nature of the request; the software algorithms that form the inner workings of ARIAD;

5 A press release received early in October 1981 at the Bulletin of Prosthetics Research announced that the National Rehabilitation Information Center (NARIC) has received from the California Department of Rehabilitation a $73,467 contract to continue development work on the ABLEDATA System. The release described the ABLEDATA System as "Rehabilitation product information and a network of information brokers . . . a service of the National Rehabilitation Information Center." Development work under the contract was said to include increase of the database from the then current 3,000 to more than 4,000 items by December 1981. The ABLEDATA letterhead bore the address of the Catholic University of America, 4407 Eighth St. N.E., Washington, D.C. 20017. Those wishing further information were referred to Marian Hall at NARIC, telephone number 202-635-5826.
the type of information available from ARIAD; and finally its present status. For potential users of such a system, the front and later portions of this paper will be of primary interest. For those using or developing information retrieval systems, the sections that discuss the coding scheme and software may be of primary interest.

This paper has been written for two main aims: (i) to propose a coding scheme which will reliably match a handicapped person's functional limitations with the operational characteristics of an assistive device; and (ii) to publicly describe an information retrieval system that is presently serving the people of Louisiana and surrounding states.

Overview of ARIAD

Figure 1 shows a block diagram of the ARIAD program. A doctor, physical therapist, occupational therapist, or rehabilitation counselor would write to the department requesting information on available devices to help his patient—a quadriplegic person, for example. Using information about the patient's functional disabilities as supplied by the requestor, the computer operator would generate an input disability code which would be used by ARIAD. The computer would then search through its files, selecting only data on those assistive devices that could meet the needs of that disabled person. A listing of the device information would then be sent back to the requestor who then makes the final choice.

ARIAD has been designed to suggest potentially suitable devices rather than to prescribe devices, for two reasons: (i) The computer operator generally would not have a complete background on the patient nor be as well-trained in rehabilitation as the requestor; and (ii) The requestor knows the patient intimately and is fully aware of the patient's disabilities and his present or desired lifestyle. The responsibility for prescribing any particular aid would therefore be best handled by the person having direct contact with the patient. ARIAD has been designed to function in a manner similar to that of the computerized searches for bibliographic information used in libraries.

Description of Coding Scheme

A suitable device for a handicapped person must not require control actions nor perceptual abilities outside the residual capabilities of that person. Therefore, some type of classification of both the disabilities and the device characteristics is necessary. After considerable research and study, a single coding scheme has been developed to denote three key parameters: (i) the physical dysfunctions of the person, (ii) the physical abilities needed to operate an assistive aid, and (iii) the disabilities for which that aid was designed. The first parameter is contained in the disability code, and the last two are contained in the device code. ARIAD uses these codes to generate three arrays and then compares them to ascertain which assistive devices are suitable and which ones are not. Details of how the computer program performs these comparisons are given in the next section of this paper.

Information about the disabilities of the person for whom a search is being conducted is entered into ARIAD using a specially designed disability code. In designing this code, the various dysfunctions which can result from medical disorders such as spina bifida, spinal-cord injury, cerebral palsy, amputation, etc., were reviewed. It was decided that a code describing the actual physical disabilities, rather than the medical aspects of the disorders, would be best. A code which describes the functional disabilities is unique and unambiguous, whereas a code denoting medical disorders might not accurately reflect a person's actual condition, especially if there are atypical problems. Nevertheless any coding system inevitably involves generalizations. Since the quality of ARIAD depends heavily on accurate coding of the devices, a rehabilitation engineer and an occupational therapist do that coding. Then an operator uses the interactive computer programs to add to or edit the existing data bank.

Disability Code—Based on a survey of various disabling disorders, six major categories of deficiencies have been defined: AMPUTATION which covers surgical, traumatic, and congenitally missing body parts; MOTOR which covers motor dysfunctions; TACTILE which covers dysfunction in perceiving touch, pressure, vibration, and temperature via
the skin; BOTH which denotes motor and tactile dysfunctions in the same part of the body; SENSORY which covers any dysfunctions in senses other than tactile; and VISCERAL which covers dysfunctions in major organs of the viscera such as the heart, kidney, and bladder. These categories of deficiencies and the aids for them have been respectively abbreviated and cataloged as follows:

<table>
<thead>
<tr>
<th>Major Categories</th>
<th>Catalog No. (in octal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A–Amputation</td>
<td>10,000–17,777</td>
</tr>
<tr>
<td>B–Both motor and tactile</td>
<td>20,000–27,777</td>
</tr>
<tr>
<td>M–Motor</td>
<td>30,000–37,777</td>
</tr>
<tr>
<td>S–Sensory</td>
<td>40,000–47,777</td>
</tr>
<tr>
<td>T–Tactile</td>
<td>50,000–57,777</td>
</tr>
<tr>
<td>V–Visceral</td>
<td>60,000–67,777</td>
</tr>
</tbody>
</table>

Within the major dysfunction of “Sensory”, four subcategories have been defined.

**Components of the Sensory Category**

- B–Blindness
- H–Hearing loss
- S–Smell
- T–Taste

Under the “Visceral” category, the following subregions are used:

**Visceral Subregions**

- H–Heart
- K–Kidney
- P–Pancreas
- B–Bladder

More visceral subregions can be added to the above list when the applicable devices become available.

Ten anatomical subregions have been defined so that the site of a particular dysfunction, complete or partial, can be designated. These subregions are used in conjunction with the major categories of “Amputation,” “Motor,” “Tactile,” and “Motor/Tactile.”

**Anatomical Subregions**

- 1–Head
- 2–Neck
- 3–Whole arm
- 4–Below elbow
- 5–Hand
- 6–Pelvis
- 7–Whole leg
- 8–Below knee
- 9–Foot
- 0–Mouth

The above categories and subregions are used as follows: The first character of the disability code designates one of the six major categories while the successive characters designate the dysfunctional anatomic or visceral subregions. Periods serve to set off the different major categories and to separate the various subregions associated with each major category.

For example, the patient disability code B.37. indicates that there are both motor and tactile losses (B) in his arms (3) and legs (7). Such a code might designate a quadriplegic.

It is important to note that a disability code does not necessarily indicate that a complete dysfunction exists, but rather some significant degree of dysfunction is present. To further illustrate, someone with a weak heart might be coded as V.H., where (V) indicates the visceral category and (H) refers to the heart. Someone who is blind would be coded as S.B. where (S) represents the sensory category and (B) represents the loss of sight.

A person having dysfunction in more than one major category would have codes for each of his separate dysfunctions strung together in a series. For example, a blind person who has lost motor control in his hands and neck also has a kidney problem could be coded as M.25.S.B.V.K. where M.25. represents motor losses (M) in the neck (2) and hands (5); S.B. represents a sensory loss (S) in the eyes (B); and V.K. represents a visceral dysfunction (V) in the kidneys (K).

An important feature of this disability code is that the major categories and the subregions within them do not need to be listed in any particular order. It is required only that the appropriate anatomic subregions be listed following each category and that periods be used to delineate the categories and subregions. For instance, the previous code could have also been written as follows:

- V.K.M.52.S.B.

**Device Code**—Each assistive device stored in ARIAD is assigned a device code. Based on available information, the two main sets of characteristics of the device are ascertained: (i) the types of disabilities which the device is intended to help, and (ii) physical capabilities required for its use. The device code uses the same major categories of dysfunction and anatomical subregions that the disability code uses except that the alphanumeric symbols carry a slightly different meaning. In a device code, the presence of a “D” in front of any major dysfunction category signifies that the device was designed specifically for such a disability. All major categories in the device code not preceded by a “D” delineate those functional abilities needed to operate the device. The presence or absence of the D-prefix allows the device code to reflect accurately the key characteristics of any assistive aid.

For example, the familiar Optacon, which displays printed letters via vibratory reeds that can be sensed by a blind person’s fingertips, would be assigned the device code DS.B.B.5. The first part of this code (DS.B.) signifies that the Optacon was designed for persons with visual impairments. The second part of this code (B.5.) signifies that a user must have both motor and sensory capabilities in his hands in order to effectively use the Optacon.

In another example, the device code DS.B.M.3.S.H.B.5. would be assigned to an aid that would help a blind person (DS.B.) who must be able to control his arms (M.3.), be able to hear (S.H.), and who has both motor control and tactile sensation in his hands (B.5.). An assistive device which could help such an individual is the laser cane. This electronic travel aid for the blind combines a long cane with built-in secondary electronics plus laser detection capabilities. Warnings of overhead projections and surface...
irregularities are presented as auditory tones of high and low frequencies, respectively. Warnings of straight ahead obstacles are presented tactually by means of a vibratory reed or electrocutaneous stimulation sensed by the index finger; see reference (5).

**Description of Software**

ARIAD was written using the FORTRAN IV-Plus Scientific Programming Language. FORTRAN was chosen primarily for its speed and ease in programming. ARIAD has been divided into five phases: (i) the initialization phase, (ii) the patient array set-up phase, (iii) the device data set-up phase, (iv) the comparison phase, and (v) the output phase.

The main program, MARIAD, forms the foundation upon which these phases are built. MARIAD coordinates the data transfers between the individual subroutines, indicated in Figure 2, and also provides the necessary control statements to bind the subroutines together. In this way MARIAD serves as the root from which all the subroutines branch.

The initialization phase is handled by the subroutine QUEST. During initialization the following interactive questions guide the computer operator in providing the necessary background information:

1. What is the date?
2. How many different requests for information do you wish to make?
3. What is each requestor's name and address?
4. What is each patient's name (or some other identifying information)?
5. What is each patient's disability code?
6. What type of device is desired for each patient?

The “type of device” asked in question 6 refers to one of the following classifications:

- aids for daily living
- mobility aids
- recreational aids
- eating aids
- hygiene aids
- occupational aids
- all aids.

Inclusion of such classifications permits a more focused selection of suitable aids for the intended user. If “all aids” is selected, a general output of all suitable aids for the intended patient is generated. Additional classifications can be added to ARIAD as needed.

The computer operator’s answers to the questions are stored as alphanumeric data because alphanumeric formatting has the desirable characteristic of processing data which contains both letters and numbers. Answers to questions 5 and 6 are used to determine which devices are most suitable for the patient. Answers to the other questions appear in the final output.

The second phase begins when MARIAD calls PARRAY to generate the patient's disability matrix. This matrix defines the functional disabilities of the patient and is used for selecting suitable assistive devices during the comparison phase of MARIAD. Each row of the matrix corresponds to a particular category of disability. The first row denotes the disabilities related to amputation; the second row denotes both motor and tactile deficiencies; the third row denotes only the motor dysfunctions; the fourth row denotes only the sensory dysfunctions; the fifth row denotes tactile dysfunctions; and the sixth row denotes dysfunctions in the organs of the viscera. The columns of the matrix contain the alphanumeric designations for the affected body parts. For example, the matrix for the disability code S.B.V.K.M.257 would be

```
<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>K</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
```

Each row of the above matrix ends with the number “11” which acts as the terminating symbol. (When there are no dysfunctions in a particular category, the corresponding row begins with the number “11” as is the situation for rows 1, 2, and 5 above.)

The third or motor disabilities row contains the numbers “2,5,7,8, and 9.” The numbers “8” and “9” are not explicitly listed in the disability code of S.B.V.K.M.257., but they are implied by the frequent patterns of physical disability. In this example “7” signifies movement difficulties in the upper leg. In general, a person who is unable to move the upper leg also cannot move his lower leg or his foot. Therefore, when the number “7” is specified, PARRAY generates the code for the other most-probably-affected areas. The same general pattern of disability is assumed for the case of the upper limb.

When the subroutine PARRAY ends, the device data phase begins with MARIAD storing data on each of a group of 25 assistive devices in a two dimensional array named IDV. MARIAD now uses IDV and the subroutine ARRAY to create two more matrices for each device—one matrix describing sensory loss in eyes, visceral dysfunction (kidneys), motor losses in neck, hands, and whole leg.
the disabilities for which the device was designed to help (IDES) and the other matrix describing the abilities required to operate the device (INOTD).

The matrices that would be generated for the device code—DS.BH.B.5—is shown below as an example.

<table>
<thead>
<tr>
<th>Abilities Required</th>
<th>Abilities Designed For</th>
<th>Disabilities Required</th>
<th>Disabilities Designed For</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 0 0 0 0</td>
<td>33 0 0 0 0</td>
<td>5 22 0 0 0</td>
<td>B H 33 0 0</td>
</tr>
</tbody>
</table>

The row terminators for these matrices are '33' and '22' respectively. Again, each row represents a disability category, and each column represents an affected body area or sensation. Since there are 25 devices in each group processed, ARRAY generates 50 matrices (25 IDES matrices and 25 INOTD matrices).

Before MARIAD compares the patient's disability array (IDIS) with the device arrays (IDES and INOTD), each device is checked to see if it corresponds to the device-type selected during question 6 of the initialization phase. For example, if the type selected earlier was hygiene, then only those devices which apply to hygiene will be compared.

The next comparison is between the IDIS and INOTD arrays. If the device was not designed to help such a patient, it is deleted from further considerations by MARIAD and the next device is compared. If no conflict occurs between IDIS and INOTD for a particular device, IDIS is then compared with IDES of that device for compatibility. When compatibility with both INOTD and IDES is found, this device is deemed to be potentially suitable and the information about it is printed out. After all 25 devices have been compared against the patient's disability matrix, MARIAD returns to the device data phase and reads in 25 more devices. This process continues until all device information stored in ARIAD has been examined for each search request.

In order for MARIAD to operate at peak efficiency, two support programs, FILMOD and SEARCH, have been implemented to permit easy inputting and editing of new device data. FILMOD reads in new data, checks for errors in the device codes, and sorts the new and old devices according to preassigned catalog numbers. If any errors are found in the data, the errors are printed on the CRT for correction by the computer programmer. Periodic updating of information is made possible through SEARCH which enables the programmer to either update (or delete) a range of assistive devices or to update just one specific device.

**Information Available from ARIAD**

Information provided by ARIAD covers a wide scope of devices, from mobility aids for the blind to recreational aids for the immobile. Such a broad spectrum of devices is expected to benefit a maximum number of potential requestors and/or their patients. Practical limitations prohibit storing information on every item listed in every catalog of aids. Only representative aids and their main accessories are incorporated into ARIAD. The decision on whether to include or exclude an item depends on the soundness of its design and its expected usefulness. These admittedly somewhat subjective judgements are necessarily based on available descriptions of the device. A degree of professional objectivity is contributed by the combined expertise of the rehabilitation engineer and occupational therapist, with their access to evaluation literature both at the research and the clinical application levels. The final determination of a device's soundness, as well as its suitability for a specific application with a specific individual user, must remain the responsibility of the person using the system: ARIAD provides information, not a prescription.

The information sources upon which ARIAD is based are as varied as the devices they describe. Almost 100 catalogs and references have been abstracted for information. A brief illustrative list of typical sources is given below: International Guide to Aids and Appliances for Blind and Visually Impaired Persons

Everest & Jennings Distributor Catalog
The Maddak Catalog
The Beok Catalog
The Green Pages
The Non-Vocal Communication Resource Book.

Manufacturer's releases on new products are also utilized, thus providing information on the latest devices that are available. Magazines and catalogs also permit periodic updating of information about existing devices. When a new catalog comes out, the information in it is checked against the stored information to insure accurate and current data. Any new aids are evaluated for possible addition to the data bank.

Information about a potentially suitable assistive device appearing in the computer printout includes a description of the device, the manufacturer's and/or distributor's names and addresses, the cost of the devices, the printing date of the information source, and the date of the most recent update (Fig. 3). A covering letter attached to the output suggests how the requestor should interpret and use the information provided in response to his oral or written request.

**Present Status**

The advisory service of ARIAD is fully operational and available on a no-cost basis. More than 30 formal and informal requests for information were processed during the first 6 months following an announcement made to the vocational rehabilitation counselors of Louisiana regarding the availability of ARIAD. The request rate has steadily risen since then, as more and more vocational rehabilitation counselors, physical and occupational therapists, and physiatrists in Louisiana and nearby states have become aware of ARIAD's utility. However, the request rate for ARIAD
is not expected to reach the numbers that the proprietary system of Accent on Information has or will reach, simply because ARIAD is a local system designed to serve the needs of the region.

Periodic reviews of the device classifications and the coding scheme are being performed. Eight to 10 new devices are added weekly, and updating of the information on previously stored devices is done as new information is received through retail catalogs and advertisements in magazines for the physically handicapped. There are now more than 900 representative aids for which data is stored in a readily retrievable format.

ARIAD was originally intended to advise rehabilitation counselors and other direct service providers in Louisiana. The request rate of 4 to 6 per month is not surprising or indicative of nonacceptance by the intended users. Although the service was announced only regionally, a number of out-of-state requests have been processed with favorable results. Approximately 70% of all requests have come from direct rehabilitation service providers, and about 25% have come from disabled persons or their families. Feedback from users of ARIAD has been generally positive. Several suggested changes are being implemented.

In summary, ARIAD as described in this report appears to be a helpful service for persons involved with prescribing or ordering assistive devices for the physically handicapped. The information stored, the coding scheme used to mechanize the matching of handicaps with various aids, and the supporting software to keep ARIAD current and growing have all proved to be very workable and cost effective. Only one full-time-equivalent person is needed to maintain ARIAD and respond to requests, and the entire information system has been implemented on a minicomputer of modest size and capability.

FIGURE 3.
Sample output of ARIAD.

<table>
<thead>
<tr>
<th>DISABILITY CODE</th>
<th>CATALOG NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS.B.M.57</td>
<td>M</td>
</tr>
<tr>
<td>TELESCOPING FIBERGLASS CANE</td>
<td>40012</td>
</tr>
<tr>
<td>MADE IN 6 SECTIONS FROM WHITE, TUBULAR FIBERGLASS. CANE SECTIONS TELESCOPE INTO HANDLE WHEN CASE IS CLOSED. CLOSED LENGTH IS APPROXIMATELY 11 IN. VERY LIGHTWEIGHT AND SENSITIVE TO PRESSURE OR TOUCH. NOT FOR USE BY PERSONS NEEDING SUPPORT IN WALKING. MADE IN ANY LENGTH DESIRED BY PURCHASER.</td>
<td></td>
</tr>
</tbody>
</table>

MODEL NUMBER: UNAVAILABLE
MANUFACTURER/DEVELOPER:
MR. WALTER L. CRANDELL
7683 LAKEVILLE HIGHWAY
PETALUMA, CA 94952 USA

AVAILABILITY STATUS: COMMERCIAL
PRICE: $10.00
MOST RECENT UPDATE: 06/28/79
DATE OF INFORMATION SOURCE: 1977

<table>
<thead>
<tr>
<th>DISABILITY CODE</th>
<th>CATALOG NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS.B.H.M.12</td>
<td>M</td>
</tr>
<tr>
<td>AUDIBLE PHOTOCONDUCTIVE LIGHT PROBE</td>
<td>40013</td>
</tr>
<tr>
<td>GENERAL-PURPOSE POCKET-SIZE INSTRUMENT DESIGNED TO DETECT AND CONVERT LIGHT DIRECTLY INTO SOUND, FREQUENCY OF WHICH RISES PROPORTIONATELY WITH INTENSITY OF LIGHT: NO SOUND IN TOTAL DARKNESS, SHRILL WHISTLE UNDER MAX. ILLUMINATION. HAS POTENTIALLY GREAT NUMBER OF USES: DETECT AND LOCATE SOURCE OF LIGHT IN ROOM, PINPOINT SIGNAL LAMPS SUCH AS THOSE FOUND ON COOKERS AND ELECTRIC BLANKET CONTROLS, LOCATE LEVEL OF LIQUIDS IN TRANSPARENT CONTAINERS, DETECT DIFFERENCE BETWEEN LIGHT AND DARK MATERIALS. AID HAS BEEN DESIGNED AS SHORT-RANGE INSTRUMENT AND IS NOT SUITABLE AS GUIDANCE AID. SIZE: 5 X 3/4 IN. WEIGHT: 3 OZ.</td>
<td></td>
</tr>
</tbody>
</table>

MODEL NUMBER: 9432
MANUFACTURER/DEVELOPER:
ROYAL NATIONAL INSTITUTE FOR THE BLIND
224 GREAT PORTLAND STREET
LONDON, W1N 6AA, ENGLAND

AVAILABILITY STATUS: COMMERCIAL
PRICE: AVAILABLE UPON REQUEST
MOST RECENT UPDATE: 06/28/79
DATE OF INFORMATION SOURCE: 1977
Acknowledgment

Project funded by grants from the Division of Vocational Rehabilitation, Office of Human Development, Louisiana Department of Health and Human Resources.

References

4. Personal Communications with Marian G. Hall, National Director of ABLEDATA, December 1979 and June 1981.

EDITOR’S NOTE

The importance of prompt access to current, accurate, and reasonably comprehensive information on assistive devices for disabled persons has been stressed repeatedly by both professionals and groups of disabled individuals. Nevertheless there seems to be very little literature in either rehabilitative engineering or information science on the different users, the types of information each category of user needs, or the variety of approaches available or being developed. Objective evaluations are needed of the effectiveness of the different approaches of dedicated and enthusiastic workers.

Workers in research and development certainly do not want to duplicate efforts or “re-invent the wheel.” Treatment teams, counsellors, and agencies or other third-party payers would like to be aware of the rapidly growing array of devices available, their sources of supply, the respective indications and contraindications, durability, purchase and life-cycle costs of each, and the expanding body of reports on user experience. Manufacturers, too, need feedback on such user experience. Disabled individuals would like to feel confident that they are using satisfactory, economical devices and that they somehow learn of genuine improvements. Legislators, budgeters, and many others seek demographic data on numbers and characteristics of actual and potential users of assistive devices.

Realistically, such ambitious goals are not fully attained even in fields with mass markets, though many sources of information exist. Various elements are provided for drugs by such sources as the Physician’s Desk Reference for Consumer Products for “over-the-counter” items and the companion Physician’s Desk Reference for prescription drugs plus the PDR Supplements for the main volume. There is also a Guide to Prescription Drug Costs. The magazine Consumer Reports, certain government reports on foods, drugs, automobiles, or other products, and columns or departments in magazines on sports, photography, boating, etc., report on various consumer products. Recently announced sources include a Directory of Biologicals and a New Product/Tecnology Sourcebook of inventions in health care, pharmaceuticals, cosmetics, and toiletries.

In the specialized yet very diversified area of rehabilitative engineering, a variety of publications (and in some cases their advertising) provide portions of the information needed on assistive devices for the disabled. Some are published by groups of disabled individuals. A few examples may suggest the range that is available. Examples of commercial ventures are the magazine Accent on Living, edited by Raymond C. Cheever, and the annual compilation The Green Pages (which is being continued by Mrs. John Erving—see BPR 10-35). The newsletter Inform, numerous pamphlets, and the looseleaf Information Sheets are published by ICTA (the International Committee on Technical Aids, Housing, and Transportation of Rehabilitation International). Each annual Rehabilitation Gazette provides information on numerous devices and publications. Specialized periodicals like Archives of Physical Medicine and Rehabilitation, or Orthotics and Prosthetics, or Journal of Speech and Hearing Research provide valuable information, primarily for professionals. The American Foundation for the Blind publishes an annual revision of its catalog of technical aids. Unfortunately, none of these inkprint documents enjoys the circulation it deserves, and that would be needed to reach the widespread body of professionals and disabled consumers.

The existing services provided by libraries, and
by abstracting and indexing services, help to store, diffuse, and retrieve information. A useful recent survey is presented in the April 1980 issue of the Drexel Library Quarterly, which has the theme “Information Services to Disabled Individuals.” The final paper describes international activities.

Major texts (like Lowman and Klinger's Aids to Independent Living—Self-Help for the Handicapped) take years of devoted effort to compile; they can provide wise advice and define stable principles, but editions quickly become incomplete and even obsolete on specific devices. Each individual consumer typically owns a few useful catalogs, but widespread diffusion to all concerned by constantly revised “hard-copy” texts or catalogs seems utterly impractical and uneconomical.

Because of the mass of data, the frequent changes, and the numerous modifiers or limitations, computers seem appealing. Computer systems include Cheever’s Accent on Information (a private venture), the newly emerging NIHR-supported ABLEDATA, the University of Washington STORPROD system serving Federal Region 10, and certain computerized aspects of the National Rehabilitation Information Center (NARIC) compilation (primarily of RSA and NIHR reports). The Clearing House on the Handicapped specializes in referring inquiries to the most appropriate agency or reference center. There are numerous other clearinghouses and data banks which include devices for the disabled, though usually incidentally in connection with primary coverage of some other aspects.

The rapid evolution of information science and technology parallels that of computers. Decreasing costs of computers and of memory are encouraging. Increasingly sophisticated programs should reduce the load on the user and sharpen the focus on devices particularly relevant to a clearly stated need.

Though answers to many questions are simple, an intermediary expert may often be needed to interpret or rephrase lay questions and technical output, to use imagination in finding sources or simply in trying synonyms, and to winnow potential useful information from a large body of partially irrelevant information retrieved by inevitably incomplete coding systems. Re-entry with other coding may sometimes be needed. Interested therapists, reference librarians, engineers, and the “information brokers” in the ABLEDATA system function in the role; ABLEDATA’s brokers “also develop supplemental local information resources” according to an October 1981 information release issued by The National Rehabilitation Information Center (NARIC). But the seeker of information, too, must be active and ingenious.

The substantial sources, plus the challenges, have led to an attempt to organize an Information Roundtable. Informal meetings were held in 1980 and 1981 in conjunction with the President’s Committee on the Handicapped.

Past history has shown that some publications cease, texts rapidly become obsolete but are rarely revised, and projects tend to disintegrate when contracts or grants terminate. A major concern is to preserve easy retrieval of expensive information through accessible, stable, self-supporting systems.

The paper by Szeto, Tingle and Cronk describes the purpose, concepts, software, and early results with a specific system that is now serving an area in and around a single state. The presentation of that paper in BPR is intended not only to record that particular project but to encourage descriptions of other systems. Reports of past experiences and discussions of the respective realistic and economic roles of individual experts with memory and judgments, collections of printed (or manuscript) data, and computerized systems are needed. Probably all variants will coexist for years to come.

Juvenal, millenia ago, asked, “Quis custodiet ipsos custodes”—“Who will watch the watchmen themselves?” Similarly we may need to ask, “Who will serve as clearinghouse for the clearinghouses?”

EDITOR